CLAIMS

1. A transporting apparatus, installed in a given clean environment, for transporting a large-sized thin plate from a predetermined takeoff position to a processing chamber, comprising:

a pair of upright support members standing at a predetermined interval;

at least one horizontal support table liftably cantilevered on the pair of upright support members;

lift driving means for lifting the horizontal support table vertically; and

a robot placed on the horizontal support table and having horizontally rotating arms for taking up and transporting the thin plate.

2. The transporting apparatus as claimed in claim 1, wherein the robot drives the horizontally rotating arms to take the thin plate from or back to between the pair of upright support members.

3. The transporting apparatus as claimed in claim 2, wherein the horizontal support table comprises tilt adjusting means for changing an angle of the robot placed on the horizontal support table with respect to a horizontal plane.

4. The transporting apparatus as claimed in claim 3, further comprising deflection compensating means for compensating a

deflected amount in a vertical direction of the rotating arms and a deflected amount of end effectors provided at respective ends of the rotating arms for taking up and transporting the thin plate.

5. The transporting apparatus as claimed in claim 4, wherein the deflection compensating means compensates both of the deflected amounts when the end effectors take up the thin plate.

6. The transporting apparatus as claimed in claim 5, wherein the deflection compensating means comprises deflection storing means for storing deflected amounts in the vertical direction at a plurality of predetermined measurement points involved in movement of a reference point on the rotating arms or the end effectors and, every time the reference point moves to one of the measurement points, the deflection compensating means reads a deflected amount corresponding to a present position from the deflection storing means to compensate the deflected amount.

7. The transporting apparatus as claimed in claim 6, wherein the deflection storing means stores both a deflected amount due to a self weight and a deflected amount due to holding of the thin plate, and the deflected amount due to the self weight and the deflected amount due to holding of the thin plate are used to change a compensation amount.

8. The transporting apparatus as claimed in any one of claims

4 through 7, wherein the deflection compensating means comprises compensation controlling means for controlling the lift driving means to raise or lower the horizontal support table based on the deflected amount thereby to compensate deflection of the rotating arms or the end effectors.

9. The transporting apparatus as claimed in any one of claims 4 through 7, wherein the deflection compensating means comprises compensation controlling means for controlling the tilt adjusting means to tilt the robot placed on the horizontal support table so as to raise or lower the end effectors or the rotating arms thereby to compensate deflection of the rotating arms or the end effectors.

10. The transporting apparatus as claimed in any one of claims 4 through 7, wherein the deflection compensating means comprises compensation controlling means for controlling the lift driving means and the tilt adjusting means so as to raise or lower the horizontal support table and/or control the tilt adjusting means to performed tilting based on the deflected amount thereby to compensate deflection of the rotating arms or the end effectors.

11. The transporting apparatus as claimed in any one of claims 1 through 7, further comprising:

placing position detecting means including a placing position sensor for detecting passage of the thin plate held

by the end effectors and calculating means for calculating a displaced amount of the placing position from the reference point based on a detected signal of the placing position sensor; and

displacement compensating means for compensating the displaced amount of the placing position based on the calculated displaced amount.

12. The transporting apparatus as claimed in claim 11, wherein the placing position detecting means calculates a displaced amount in an X axis direction, a displaced amount in a Y axis direction and a displaced amount in a rotational direction from the predetermined reference point and the displacement compensating means compensates the displaced amounts by moving the end effectors in such a direction that the calculated displaced amounts are cancelled.

13. The transporting apparatus as claimed in any one of claims 1 through 7, further comprising moving means for moving the pair of upright support members horizontally.

14. The transporting apparatus as claimed in any one of claims 1 through 7, further comprising a beam for fixedly coupling top portions of the pair of upright support members while the pair of upright support members is held in parallel.

15. A transporting control method of a transporting apparatus,

installed in a predetermined clean environment and having rotating arms and end effectors, for transporting a large-sized thin plate from a predetermined takeoff position to a processing chamber, comprising the steps of:

(a) based on position data of accessed position of the rotating arms and the end effectors, calculating a moving amount in a horizontal direction, a moving amount in a vertical direction and driving data of the rotating arms and the end effectors;

(b) moving a robot based on the moving amount in the horizontal direction and the moving amount in the vertical direction and driving the rotating arms and the end effectors based on the driving data;

(c) reading from storing means deflection data of the rotating arms and the end effectors which are extended;

(d) calculating compensation data for compensating a deflected amount based on the deflection data; and

(e) controlling to adjust the moving amount in the vertical direction based on the compensation data thereby to compensate the deflected amount.

16. The transporting control method as claimed in claim 15, the step (e) being replaced with the step (f) of adjusting a tilt angle of the robot based on the compensation data thereby to compensate the deflected amount.

17. The transporting control method as claimed in claim 15, the

step (e) being replaced with the step (g) of adjusting the moving amount in the vertical direction and/or the tilt angle of the robot based on the compensation data thereby to compensate the deflected amount.

18. The transporting control method as claimed in any one of claims 15 to 17, wherein the deflection data read in the step (c) includes deflection data at a plurality of moving points the rotating arms and the end effectors and the compensation data calculated in the step (d) includes compensation data at each of the moving points.

19. The transporting control method as claimed in claim 18, wherein in the step (c), the deflection data read from the storing means depends on whether the thin plate is held or not.

20. The transporting control method as claimed in any one of claims 15 to 17, wherein in the step (c), read from the storing means is the compensation data calculated and stored in advance based on the deflected amount; calculating of the compensation data in the step (d) is not performed; and processing in the step (e) is performed based on the read compensation data.

21. The transporting control method as claimed in any one of claims 15 to 19, further comprising the steps of:

(h) detecting a placing position of the thin plate held by the end effectors;

(i) comparing the placing position and a predetermined reference placing position to calculate a displaced amount; and

(j) performing operational control to compensate the displaced amount.

22. The transporting control method as claimed in claim 21, wherein the displaced amount in the step (i) includes a displaced amount in an X axis direction, a displaced amount in a Y axis direction and a displaced amount in a rotational axis direction from the reference placing position, and the operational control in the step (j) is performed to compensate each of the displaced amounts in the step (i).